

SPE RESPONSE FOR CERTIFICATE OF CORRECTION

Paper No.: X

DATE : JUNE 7, 2007

TO SPE OF : ART UNIT 2884

SUBJECT : Request for Certificate of Correction for Appl. No.: 10648916 Patent No.: 7148487B2

A response is requested with respect to a request for a certificate of correction.

With respect to the change(s) requested to correct Office and/or Applicant's errors, should the patent read as shown in the certificate of correction attached herewith or the COCIN document(s), in IFW images for the above-identified patented application? No new matter should be introduced, nor should the scope or meaning of the claims be changed.

If the response is for an IFW, within 7 days, please complete and forward the response, to the employee (named below) via scanning into application images, using document code **COCX**.

DO NOT SENT TO ATTORNEY

If the response is for a paper file wrapper, please complete the response and forward the response with the paper file wrapper, to the employee (named below), within 7 days, to:

**Certificates of Correction Branch (CofC)
South Tower - 9A22
Palm Location 7580**

VIRGINIA TOLBERT

Certificates of Correction Branch

703-308-9390 ext. 113

Thank You For Your Assistance

The request for issuing the above-identified correction(s) is hereby:

Note your decision on the appropriate box.

☒ **Approved**

All changes apply.

☐ **Approved in Part**

Specify below which changes do not apply.

☐ **Denied**

State the reasons for denial below.

Comments: _____


SPE
SUPERVISOR
TECHNOLOGY CENTER 2880

2884
Art Unit

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eiji SAKAMOTO

Group Art Unit: 2881

Patent No.: 7,078,706

Examiner: Bernard SOUW

Issued: July 18, 2006

For: CHAMBER, EXPOSURE APPARATUS, AND DEVICE MANUFACTURING
METHOD

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT

Commissioner for Patents
Office of Patent Publication
ATTN: Certificate of Correction Branch
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is Form PTO-1050.

- ☐ All errors were the fault of the Patent and Trademark Office, no fee is required.
- ☒ Not all errors were the fault of the Patent and Trademark Office, please charge the requisite fee of \$100 to Deposit Account No. 13-4500, Order No. 1232-5125.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment to Deposit Account No. 13-4500, Order No. 1232-5125.

STATEMENT REGARDING CANCELLATION OF CLAIMS 18-22

Claims 18-22 of U.S. Patent No. 7,148,487 should not have issued with the patent. Patentees submit that this error was incurred through the fault of the USPTO as clearly disclosed by USPTO records. On July 26, 2006, the USPTO mailed a Notice of Allowability (Exhibit 1) indicating that claims 1, 2, 6-15, 18, 19, 21-23, and 28-32 had been allowed. On September 12, 2006, Patentees filed an Amendment Under 37 C.F.R. § 1.312 (Exhibit 2) that canceled claims 23, 28-30 and 32. The Examiner had since renumbered claims 23, 28-30 and 32 as claims 18-22 respectively. *See* Issue Classification Form (attached hereto as Exhibit 3). On November 13, 2006, the USPTO mailed a Response to Rule 312 Communication (Exhibit 4), indicating that the Rule 312 Amendment filed on September 12, 2006 had been entered. Therefore, claims 18-22, which correspond to allowed claims 23, 28-30, and 32, should not have been a part of the issued patent. Patentees are, however, submitting the requisite \$100 fee for issuance of a Certificate of Correction because not all errors indicated on the attached PTO-1050 form were the fault of the USPTO.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.

Dated: May 25, 2007

By: /Ankur Parekh/
Ankur Parekh
Registration No. 56,060

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**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**

PATENT NUMBER : 7,148,487
DATED : December 12, 2006
INVENTOR(S) : Takamasa ISHII et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 6, line 31, the first instance of "and" (preceeding "ath") should be changed to --an--;
line 34, "column" should be changed to --column--.

Column 31, line 6, cancel the text beginning with "18. A radiation image sensing appartus for sensing a" to and including "arranged over said switch element." in column 32, line 36 (i.e., cancel the entire text of claims 18-22).

MAILING ADDRESS OF SENDER: Morgan & Finnegan, LLP
3 World Financial Center
New York, NY 10281-2101

PATENT NO. 7,148,487

No. of additional copies

⇒ 1

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Exhibit 1

Notice of Allowability

Application No.

10/648,916

Examiner

Albert J. Gagliardi

Applicant(s)

ISHII ET AL.

Art Unit

2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to submissions of 30 June 2006.
2. ☒ The allowed claim(s) is/are 1,2,6-15,18,19,21-23 and 28-32.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____. | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

Exhibit 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : ISHII et al.
Serial No. : 10/648,916 Art Unit : 2878
Filed : August 27, 2003 Examiner : A. Gagliardi
For : IMAGE SENSING APPARATUS AND METHOD USING
RADIATION

AMENDMENT UNDER 37 C.F.R. § 1.312

Mail Stop – Issue Fee

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an amendment after notice of allowance under 37 C.F.R. § 1.312. This
paper is set forth as follows:

Amendments to the Claims are reflected in the listing of claims, which begin on

Page 2 of this paper

Remarks begin on Page 8 of this paper.

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all previous claim listings.

Listing of claims:

1. (previously presented): A radiation image sensing apparatus for sensing a radiation by a sensing unit and outputting an electric signal corresponding to the sensed radiation, wherein said sensing unit comprising:
 - a substrate;
 - a conversion section arranged on said substrate and, configured to have a first semiconductor conversion element for converting the radiation into an electrical signal and a switch element connected to the first semiconductor conversion element, for switching the electrical signal; and
 - a second semiconductor conversion element arranged on said substrate, configured to convert the radiation into an electrical signal for detecting a dose of the radiation incident on said conversion section,wherein each of the first semiconductor conversion element and the second semiconductor conversion element has a semiconductor layer which has originally been formed on a common layer on the substrate, and
wherein said second semiconductor conversion element has a structure of a field effect transistor.
2. (previously presented): The apparatus according to claim 1, characterized in that said switch element has a semiconductor layer thinner than said semiconductor layers of said first and second semiconductor conversion elements.
3. (canceled)

4. (canceled)

5. (canceled)

6. (original): The apparatus according to claim 1, characterized by further comprising a wavelength conversion member which is arranged above said first and second semiconductor conversion elements to convert a wavelength of the radiation that becomes incident.

7. (original): The apparatus according to claim 1, characterized in that said first and second semiconductor conversion elements are stacked above said switch element.

8. (previously amended): The apparatus according to claim 1, characterized by further comprising a bias line which is connected to a first electrode arranged for said first semiconductor conversion element.

9. (original): The apparatus according to claim 1, characterized in that said switch element comprises a thin film transistor.

10. (original): The apparatus according to claim 1, characterized in that said second semiconductor conversion element detects the total dose of the radiation.

11. (previously presented): The apparatus according to claim 8, characterized in that

said first semiconductor conversion element and said switch element are arranged in a matrix on said substrate,

the first electrode is connected to one of a plurality of bias lines arranged in parallel, and

a second electrode is connected to the bias line to which the first electrode of said first semiconductor conversion element adjacent to said second semiconductor conversion element is connected.

12. (previously presented): A radiation image sensing apparatus for sensing a radiation by a sensing unit and outputting an electric signal corresponding to the sensed radiation, wherein said sensing unit comprising:

a substrate;

a conversion section arranged on said substrate and, configured to have a first semiconductor conversion element for converting the radiation into an electrical signal and a switch element connected to the first semiconductor conversion element, for switching the electrical signal; and

a second semiconductor conversion element arranged on said substrate, configured to convert the radiation into an electrical signal for detecting a dose of the radiation incident on said conversion section,

wherein:

each of the first semiconductor conversion element and the second semiconductor conversion element has a semiconductor layer which has originally been formed on a common layer on the substrate,

there exist a first pixel which includes said first semiconductor conversion element and said second semiconductor conversion element

and a second pixel which includes said first semiconductor conversion element and no second semiconductor conversion element,

an area of the first pixel is substantially equal to that of the second pixel, and

a light-receiving area of said first semiconductor conversion element in the first pixel is smaller than that of said first semiconductor conversion element in the second pixel.

13. **(original)**: The apparatus according to claim 12, characterized in that a plurality of said second semiconductor conversion elements are placed in said conversion section, and

when an array of the first and second pixels which are arranged in a direction in which the bias line runs is defined as a row, and an array of the first and second pixels which are arranged in a direction perpendicular to the row is defined as a column, at least some of said plurality of second semiconductor conversion elements are formed in a plurality of second pixels which constitutes the same row or column.

14. **(previously presented)**: The apparatus according to claim 8, characterized in that said second semiconductor conversion element has a structure of a field effect transistor which uses a second electrode as one of source and drain electrodes.

15. **(original)**: The apparatus according to claim 14, characterized in that at least one electrode selected from the group consisting of the other of the source and drain electrode of said second semiconductor conversion element and a control electrode is connected between a plurality of second pixels.

16. (canceled)

17. (canceled)

18. (original): The apparatus according to claim 8, characterized in that the second electrode has a transparent electrode film which comes into contact with the bias line.

19. (original) The apparatus according to claim 8, characterized in that said second semiconductor conversion element has an ohmic contact layer which comes into contact with the bias line as the second electrode.

20. (canceled)

21. (original): The apparatus according to claim 8, characterized in that the first electrode has a transparent electrode film which comes into contact with the bias line.

22. (original): The apparatus according to claim 8, characterized in that said first semiconductor conversion element has an ohmic contact layer which comes into contact with the bias line as the first electrode.

23. (canceled)

24. (canceled)

25. (canceled)

26. (canceled)

27. (canceled)

28. (canceled)

29. (canceled)

30. (canceled)

31. (previously presented): The apparatus according to claim 12, characterized in that said first and second semiconductor conversion elements are arranged over said switch element.

32. (canceled)

REMARKS

Applicants thank the Examiner for the telephonic interview on August 30, 2006. In that interview, the undersigned informed the Examiner that (1) during prosecution, Applicants had inadvertently stated that allowed claims 23, 28-30 and 32 read on the elected species when it appears that they in fact do not; and (2) these claims do not depend from an allowed generic claim. The Examiner noted the undersigned's comments. The Examiner stated, however, that he had considered these claims before allowing the application, that he was satisfied with the record as is, and that therefore, he would take no further action with respect to this application. While Applicants appreciate the Examiner's decision, they do not wish to accept claims that they may not be entitled to. Therefore, by this paper, Applicants have canceled claims 23, 28-30 and 32. No other changes are made by this paper.

THE COMMISSIONER IS HEREBY AUTHORIZED TO CHARGE ANY ADDITIONAL FEES WHICH MAY BE REQUIRED FOR THE TIMELY CONSIDERATION OF THIS AMENDMENT UNDER 37 C.F.R. §§ 1.16 AND 1.17, OR CREDIT ANY OVERPAYMENT TO DEPOSIT ACCOUNT NO. 13-4500, ORDER NO. 1232-5125.

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P.


Dated: September 12, 2006

By: /Ankur Parekh/
Ankur Parekh
Registration No. 56,060


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Exhibit 3

Issue Classification 	Application/Control No. 10/648,916	Applicant(s)/Patent under Reexamination ISHII ET AL.
	Examiner Albert J. Gagliardi	Art Unit 2884

ISSUE CLASSIFICATION											
ORIGINAL					INTERNATIONAL CLASSIFICATION						
CLASS		SUBCLASS			CLAIMED					NON-CLAIMED	
250		370.14			G	1	T	1	/24		
CROSS REFERENCES											
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)										
250	370.09										
257	428										

(Assistant Examiner) (Date) <i>L. Wise</i> 7/25/06 (Legal Instruments Examiner) (Date)		 Albert Gagliardi 7/20/06 (Primary Examiner) (Date)		Total Claims Allowed: 22 O.G. Print Claim(s) 1		O.G. Print Fig. 3	
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<input type="checkbox"/> Claims renumbered in the same order as presented by applicant				<input type="checkbox"/> CPA				<input type="checkbox"/> T.D.				<input type="checkbox"/> R.1.47			
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	31		61		91		121		151		181		
2	2	19	32		62		92		122		152		182		
	3		33		63		93		123		153		183		
	4		34		64		94		124		154		184		
	5		35		65		95		125		155		185		
3	6		36		66		96		126		156		186		
4	7		37		67		97		127		157		187		
5	8		38		68		98		128		158		188		
13	9		39		69		99		129		159		189		
14	10		40		70		100		130		160		190		
6	11		41		71		101		131		161		191		
15	12		42		72		102		132		162		192		
16	13		43		73		103		133		163		193		
7	14		44		74		104		134		164		194		
8	15		45		75		105		135		165		195		
	16		46		76		106		136		166		196		
	17		47		77		107		137		167		197		
9	18		48		78		108		138		168		198		
10	19		49		79		109		139		169		199		
	20		50		80		110		140		170		200		
11	21		51		81		111		141		171		201		
12	22		52		82		112		142		172		202		
18	23		53		83		113		143		173		203		
	24		54		84		114		144		174		204		
	25		55		85		115		145		175		205		
	26		56		86		116		146		176		206		
	27		57		87		117		147		177		207		
20	28		58		88		118		148		178		208		
21	29		59		89		119		149		179		209		
22	30		60		90		120		150		180		210		

Exhibit 4



UNITED STATES PATENT AND TRADEMARK OFFICE

11A

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,916	08/27/2003	Takamasa Ishii	1232-5125	5081

27123 7590 11/13/2006
MORGAN & FINNEGAN, L.L.P.
3 WORLD FINANCIAL CENTER
NEW YORK, NY 10281-2101

EXAMINER

GAGLIARDI, ALBERT J

ART UNIT PAPER NUMBER

2884

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Response to Rule 312 Communication	Application No.	Applicant(s)	
	10/648,916	ISHII ET AL.	
	Examiner	Art Unit	
	Albert J. Gagliardi	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☒ The amendment filed on 12 September 2006 under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☒ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.

Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

Amendment directed merely to cancellation of claims. See MPEP 614.19(d)II.



 Albert J. Gagliardi
 Primary Examiner
 Art Unit: 2884

FIG. 12 is an equivalent circuit diagram showing the circuit arrangement of a radiation image sensing apparatus according to a reference example;

FIG. 13 is a layout diagram showing the overall arrangement of the radiation image sensing apparatus according to the reference example;

FIG. 14 is a layout diagram showing the planar structure of a pixel of the radiation image sensing apparatus according to the reference example, which has neither a monitor photoelectric conversion element nor lead interconnections therefor;

FIG. 15 is a layout diagram showing the planar structure of a pixel of the radiation image sensing apparatus according to the reference example, which has a monitor photoelectric conversion element;

FIG. 16 is a layout diagram showing the planar structure of a pixel of the radiation image sensing apparatus according to the reference example, which has lead interconnections for a monitor photoelectric conversion element;

FIG. 17 is a sectional view taken along a line I—I in FIG. 14;

FIG. 18 is a layout diagram showing the planar structure of a pixel of a radiation image sensing apparatus according to the fifth embodiment of the present invention, which has a monitor photoelectric conversion element;

FIG. 19 is a layout diagram showing the planar structure of a pixel of the radiation image sensing apparatus according to the fifth embodiment, which has lead interconnections for a monitor photoelectric conversion element;

FIG. 20 is a sectional view taken along a line II—II in FIG. 18;

FIG. 21 is a schematic view showing the layout of a conversion section T and circuit sections around it;

FIGS. 22A to 22D are sectional views showing steps in manufacturing the radiation image sensing apparatus according to the fifth embodiment of the present invention;

FIGS. 23A to 23C are sectional views showing steps in manufacturing the radiation image sensing apparatus according to the fifth embodiment of the present invention, which show the steps next to those shown in FIGS. 22A to 22D;

FIG. 24 is a layout diagram showing the overall arrangement of a radiation image sensing apparatus according to the sixth embodiment of the present invention;

FIG. 25 is a layout diagram showing the planar structure of a pixel of the radiation image sensing apparatus according to the sixth embodiment, which has a monitor photoelectric conversion element;

FIG. 26 is a layout diagram showing the planar structure of a pixel of the radiation image sensing apparatus according to the sixth embodiment, which has lead interconnections for a monitor photoelectric conversion element;

FIG. 27 is a sectional view taken along a line III—III in FIG. 25;

FIGS. 28A to 28D are sectional views showing a method of manufacturing the radiation image sensing apparatus according to the sixth embodiment of the present invention; and

FIGS. 29A to 29D are sectional views showing the method of manufacturing the radiation image sensing apparatus according to the sixth embodiment of the present invention, which show the steps next to those shown in FIGS. 28A to 28D.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will now be described in detail with reference to the drawings. It should be noted that the relative arrangement of the components, the numerical expressions and numerical values set forth in these embodiments do not limit the scope of the present invention unless it is specifically stated otherwise.

The embodiments of the present invention will be described below in detail with reference to the accompanying drawings. A reference example will be described for the sake of understanding of the present invention. This reference example is based on the description of U.S. Pat. No. 5,448,613 described above. FIG. 12 is an equivalent circuit diagram showing the circuit arrangement of a radiation image sensing apparatus according to the reference example. FIG. 13 is a layout diagram showing the overall arrangement of the radiation image sensing apparatus according to the reference example. FIG. 12 shows an example in which 4 (rows)×4 (columns) (=a total of 16) pixels are arranged in a pixel area. However, the number of pixels is not limited to this.

In the reference example, a combination of an image sensing photoelectric conversion element (first photoelectric conversion element) and a switching thin film transistor (TFT) or a combination of an image sensing photoelectric conversion element, switching TFT, and monitor photoelectric conversion element (second photoelectric conversion element) for AEC is arranged for each pixel. More specifically, a pixel on an *a*th row and *b*th column from the upper side in FIG. 12 has one image sensing photoelectric conversion element *Mba* and one switching thin film transistor *Tba* (*a*, *b*=1, 2, 3, 4). The pixels on the fourth column and the third and fourth rows respectively have monitor photoelectric conversion elements *MA33* and *MA34*. The pixels on the fourth column and the first and second rows respectively have lead interconnections for the monitor photoelectric conversion elements.

The four image sensing photoelectric conversion elements arranged on the *b*th column are connected to a common bias line *Vsb* so that a predetermined bias is applied from a common electrode driver circuit 156. The gate electrodes (control electrodes) of the four switching TFTs arranged on the *a*th row are connected to a common gate line *Vga* so that the gates are ON/OFF-controlled by a gate driver circuit 152. The source electrodes or drain electrodes of the four switching TFTs arranged on the *b*th column are connected to a common signal line *Sigb*. Signal lines *Sig1* to *Sig4* are connected to an image sensing signal processing circuit 151. Arrays of pixels arranged in the direction in which the bias lines run will be referred to as "columns". Arrays of pixels arranged in a direction (the direction in which gate lines run) perpendicular to the columns will be referred to as "rows".

The monitor photoelectric conversion elements *MA33* and *MA34* are TFT sensors. Their source electrodes are connected to a power supply 153, their drain electrodes are connected to a monitor signal processing circuit 154, and their gate electrodes (control electrodes) are connected to the gate driver circuit 152. In a TFT sensor, electrons and holes generated in a semiconductor layer when visible light becomes incident on it are read in accordance with an electric field between the source and the drain. That is, when a voltage is applied from the power supply 153 to each source electrode to apply a potential between the source and the drain, electrons and holes generated when the light-

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version element and the control electrode (the interconnection connected to the electrode) of the switch element may be commonly connected, as described in the fifth and sixth embodiments. According to this arrangement, the interconnection structure becomes simpler. In addition, the light-receiving areas of both of the first conversion element for image reading and the second conversion element for AEC and/or radiation monitor can be increased.

As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

What is claimed is:

1. A radiation image sensing apparatus for sensing a radiation by a sensing unit and outputting an electric signal corresponding to the sensed radiation, wherein said sensing unit comprising:

a substrate;

a conversion section arranged on said substrate and, configured to have a first semiconductor conversion element for converting the radiation into an electrical signal and a switch element connected to the first semiconductor conversion element, for switching the electrical signal; and

a second semiconductor conversion element arranged on said substrate, configured to convert the radiation into an electrical signal for detecting a dose of the radiation incident on said conversion section,

wherein each of the first semiconductor conversion element and the second semiconductor conversion element has a semiconductor layer which has originally been formed on a common layer on the substrate, and wherein said second semiconductor conversion element has a structure of a field effect transistor.

2. The apparatus according to claim 1, characterized in that said switch element has a semiconductor layer thinner than said semiconductor layers of said first and second semiconductor conversion elements.

3. The apparatus according to claim 1, characterized by further comprising a wavelength conversion member which is arranged above said first and second semiconductor conversion elements to convert a wavelength of the radiation that becomes incident.

4. The apparatus according to claim 1, characterized in that said first and second semiconductor conversion elements are stacked above said switch element.

5. The apparatus according to claim 1, characterized by further comprising a bias line which is connected to a first electrode arranged for said first semiconductor conversion element.

6. The apparatus according to claim 5, characterized in that

said first semiconductor conversion element and said switch element are arranged in a matrix on said substrate,

the first electrode is connected to one of a plurality of bias lines arranged in parallel, and

a second electrode is connected to the bias line to which the first electrode of said first semiconductor conversion element adjacent to said second semiconductor conversion element is connected.

7. The apparatus according to claim 5, characterized in that said second semiconductor conversion element has a structure of a field effect transistor which uses a second electrode as one of source and drain electrodes.

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8. The apparatus according to claim 7, characterized in that at least one electrode selected from the group consisting of the other of the source and drain electrode of said second semiconductor conversion element and a control electrode is connected between a plurality of second pixels.

9. The apparatus according to claim 5, characterized in that the second electrode has a transparent electrode film which comes into contact with the bias line.

10. The apparatus according to claim 5, characterized in that said second semiconductor conversion element has an ohmic contact layer which comes into contact with the bias line as the second electrode.

11. The apparatus according to claim 5, characterized in that the first electrode has a transparent electrode film which comes into contact with the bias line.

12. The apparatus according to claim 5, characterized in that said first semiconductor conversion element has an ohmic contact layer which comes into contact with the bias line as the first electrode.

13. The apparatus according to claim 1, characterized in that said switch element comprises a thin film transistor.

14. The apparatus according to claim 1, characterized in that said second semiconductor conversion element detects the total dose of the radiation.

15. A radiation image sensing apparatus for sensing a radiation by a sensing unit and outputting an electric signal corresponding to the sensed radiation, wherein said sensing unit comprising:

a substrate;

a conversion section arranged on said substrate and, configured to have a first semiconductor conversion element for converting the radiation into an electrical signal and a switch element connected to the first semiconductor conversion element, for switching the electrical signal; and

a second semiconductor conversion element arranged on said substrate, configured to convert the radiation into an electrical signal for detecting a dose of the radiation incident on said conversion section,

wherein:

each of the first semiconductor conversion element and the second semiconductor conversion element has a semiconductor layer which has originally been formed on a common layer on the substrate,

there exist a first pixel which includes said first semiconductor conversion element and said second semiconductor conversion element and a second pixel which includes said first semiconductor conversion element and no second semiconductor conversion element,

an area of the first pixel is substantially equal to that of the second pixel, and

a light-receiving area of said first semiconductor conversion element in the first pixel is smaller than that of said first semiconductor conversion element in the second pixel.

16. The apparatus according to claim 15, characterized in that

a plurality of said second semiconductor conversion elements are placed in said conversion section, and

when an array of the first and second pixels which are arranged in a direction in which the bias line runs is defined as a row, and an array of the first and second pixels which are arranged in a direction perpendicular to the row is defined as a column, at least some of said plurality of second semiconductor conversion elements

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are formed in a plurality of second pixels which constitutes the same row or column.

17. The apparatus according to claim 15, characterized in that said first and second semiconductor conversion elements are arranged over said switch element.

18. A radiation image sensing apparatus for sensing a radiation by a sensing unit and outputting an electric signal corresponding to the sensed radiation, wherein said sensing unit comprising:

- a substrate;
- a conversion section arranged on said substrate, configured to have a first photoconductive element, a capacitive element connected to the first photoconductive element, and a switch element connected to the capacitive element; and
- a second photoconductive element arranged on said substrate, configured to convert the radiation incident on said conversion section into an electrical signal for detecting a dose of the radiation,

wherein each of the first photoconductive element and the second photoconductive element has a semiconductor layer which has originally been formed on a common layer on the substrate; and

wherein said second photoconductive element has a structure of a field effect transistor.

19. The apparatus according to claim 18, characterized in that said first and second photoconductive elements are arranged over said switch element.

20. A radiation image sensing apparatus for sensing a radiation by a sensing unit and outputting an electric signal corresponding to the sensed radiation, wherein said sensing unit comprising:

- a substrate;
- a conversion section arranged on said substrate, configured to have a first photoconductive element, a capacitive element connected to the first photoconductive element, and a switch element connected to the capacitive element; and

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a second photoconductive element arranged on said substrate, configured to convert the radiation incident on said conversion section into an electrical signal for detecting a dose of the radiation,

wherein:

- each of the first photoconductive element and the second photoconductive element has a semiconductor layer which has originally been formed on a common layer on the substrate,

- there exists a first pixel which includes said first photoconductive element and said second photoconductive element and a second pixel which includes said first photoconductive element and no second photoconductive element,

- an area of the first pixel is substantially equal to that of the second pixel, and

- a light-receiving area of said first photoconductive element in the first pixel is smaller than that of said first photoconductive element in the second pixel.

21. The apparatus according to claim 20, characterized in that a plurality of said second photoconductive elements are placed in said conversion section, and

when an array of the first and second pixels which are arranged in a direction in which a bias line runs is defined as a row, and an array of the first and second pixels which are arranged in a direction perpendicular to the row is defined as a column, at least some of said plurality of second photoconductive elements are formed in a plurality of second pixels which constitutes the same row or column.

22. The apparatus according to claim 20, characterized in that said first and second photoconductive elements are arranged over said switch element.

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